BIOGRAPHICAL SKETCH

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NAME	POSITION TITLE
Russo, Andrew Frank	Professor
eRA COMMONS USER NAME (credential, e.g., agency login) andrewrusso	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	MM/YY	FIELD OF STUDY
University of California, San Diego	BA	1979	Biology
University of California, Berkeley	PhD	1984	Biochemistry
University of California, San Diego	Postdoc	1988	Molecular Neurobiology

A. Personal Statement

My long-standing research interest is to understand how neurons respond to changes in their environment. This interest has evolved from bacterial chemotaxis to sensory neurons. Since joining the faculty at Iowa, my lab has studied the CGRP neuropeptide gene. Most recently, we have focused on regulation of CGRP and its actions in the context of trigeminal-mediated disorders, especially migraine. The lab found that CGRP gene expression is up-regulated by inflammatory signals mediated by MAP kinases and repressed by antimigraine drugs at an 18-bp neuron-specific enhancer. Our studies are steadily moving from cell culture to *in vivo* systems, including behavioral studies. The foundation for our new studies is a CGRP-sensitized transgenic mouse model that we generated. These mice overexpress the RAMP1 subunit of the CGRP receptor in the nervous system. The RAMP1 mice have elevated CGRP-induced neurogenic inflammation, mechanical allodynia, and a unique phenotype of light aversion that is suggestive of photophobia associated with migraine. In collaborative projects, the lab is also studying the beneficial effects of CGRP and RAMP1 against hypertension and obesity, with overall goals to develop effective diagnostic and therapeutic strategies for neurovascular disorders. The studies in this proposal will advance these goals. The studies of Aim 1 on a novel regulatory region 35-kb downstream of the CGRP gene will move us by a quantum leap beyond our previous studies on the 18-bp enhancer. The studies of Aim 2 reach back to ideas from my postdoc years on connections between CGRP and the hypothalamus, especially with stress pathways. The possible convergence of CGRP and stress in migraine will be tested in the mouse model. Finally, for the past 20 years we have used a combination of genetic and pharmacological approaches, which will be used in Aim 3 to identify the CGRP-modulated neuronal pathways involved in light aversion.

B. Positions and Honors

Research and Professional Experience

1977-1979 Undergrad Res Assist, Dept Medicine (G.Gill) & Scripps Inst. Oceanography (B.Volcani), UCSD
1979-1984 Graduate Res. Assist, Instructor, Dept. Biochemistry, UC Berkeley (D.E. Koshland, Jr.)
1984-1988 Postdoctoral Research Fellow, Department of Medicine, UCSD (M.G. Rosenfeld)
1988-1994 Assistant Professor, Department of Physiology and Biophysics, University of Iowa
1989-pres Member, Genetics, Molecular and Cellular Biology, and Neuroscience Interdisciplinary Graduate Programs, Univ. Iowa
1994-2000 Associate Professor, Department of Physiology and Biophysics, University of Iowa
2000-pres Professor, Department of Molecular Physiology and Biophysics, University of Iowa
2000-pres Director, Biosciences Program, University of Iowa

Honors, Awards, Service

President's Undergraduate Fellowship, Scripps Institution of Oceanography, UC San Diego (1978)
California State Fellowship, UC Berkeley (1979)

NIH Predoctoral Fellowship, UC Berkeley (1982)
Jane Coffin Childs Postdoctoral Fellowship for Medical Research, UC San Diego (1984)
Guest Editor; Methods: Companion Methods Enzymol (1995)
NIH Molecular, Cellular, Developmental Neurobiology Study Section, member (1995-1998)
NIH MDCN-6 Study Section, member (1998-2000; ad hoc 2000-2001)
NIH NIDR Special Review Committee (1998)
Society for Neuroscience Chapters Committee (1998-2001)
University of Iowa Collegiate Teaching Award (1999)
NIH NCF Study Section, ad hoc (2003)
NIH MDCN-A, MDCN-A05, and MDCN-B02 Special Emphasis Panels (2004-2005)
NIH NIDCR Special Emphasis Panels and Physiological Neuroscience Fellowship Panel (2005, 2006, 2008, 2009)
American Physiological Society, Iowa Chapter, Secretary (2006-2008)
Visiting Professor, University of Liverpool, UK (2007)
Carver College of Medicine Outstanding Educator Award (2008)
NIMH Board Scientific Counselors, internal review panel, ad hoc (2009)
JP Long Teaching Award in the Basic Sciences, University of Iowa (2009)

C. Selected Peer-reviewed Publications

Most relevant to current application and additional recent publications (15 total)

Durham PL, **Russo AF** (2003) Stimulation of the calcitonin gene-related peptide enhancer by mitogen-activated protein kinases and repression by an antimigraine drug in trigeminal ganglia neurons. J Neurosci 23: 807-815. PMID: 12574409

Viney TJ, Schmidt TW, Gierasch W, Sattar AW, Yaggie RE, Kuburas A, Quinn JP, Coulson JM, **Russo AF** (2004) Regulation of the cell-specific calcitonin/calcitonin gene-related peptide enhancer by USF and the Foxa2 forkhead protein. J Biol Chem 279: 49948-49955. PMID: 15385550

Zhang Z, Dickerson IM, **Russo AF** (2006) Calcitonin gene-related peptide receptor activation by receptor activity-modifying protein-1 gene transfer to vascular smooth muscle cells. Endocrinology 147: 1932-1940. PMID: 16373421

Bowen EJ, Schmidt TW, Firm CS, **Russo AF**, Durham PL (2006) Tumor necrosis factor-alpha stimulation of calcitonin gene-related peptide expression and secretion from rat trigeminal ganglion neurons. J Neurochem 96: 65-77. PMID: 16277606

Bellamy J, Bowen EJ, **Russo AF**, Durham PL (2006) Nitric oxide regulation of calcitonin gene-related peptide gene expression in rat trigeminal ganglia neurons. Eur J Neurosci 23: 2057-2066. PMID: 16630053

Marquez de Prado B, **Russo AF** (2006) CGRP receptor antagonists: A new frontier of anti-migraine medications. Drug Discovery Today: Therapeutic Strategies 3: 593-597 (review). PMID: 19784396

Zhang Z, Firm CS, Marquez de Prado B, **Russo AF** (2007) Sensitization of CGRP receptors by receptor activity-modifying protein-1 in the trigeminal ganglion. J. Neurosci 27: 2693-2703. PMID: 17344407

Russo AF (2007) Ramping it up: RAMP1 and the implications for migraine. Pharmacogenomics 8: 687-690 (review). PMID: 18240900

Park K, **Russo AF** (2008) Control of the calcitonin gene-related peptide enhancer by upstream stimulatory factor in trigeminal ganglion neurons. J Biol Chem 283: 5441-5451. PMID: 18167349

Marquez de Prado B, Hammond DL, **Russo AF** (2009) Genetic enhancement of calcitonin gene-related peptide-induced central sensitization to mechanical stimuli in mice. J Pain 10 :992-1000. PMID: 19628434

Recober A, **Russo AF** (2009) Calcitonin gene-related peptide: an update on the biology. Curr Opin Neurology 22:241-246 (review). PMID: 19434786

Recober A, Kuburas A, Zhang Z, Wemmie JA, Anderson MG, **Russo AF** (2009) Role of calcitonin gene-related peptide in light aversive behavior: implications for migraine. J Neurosci 29: 8798-804. PMID: 19587287. Cited in Faculty of 1000 Medicine: http://www.f1000medicine.com/article/id/1166316/evaluation

Russo AF, Kuburas A, Kaiser EA, Raddant, AC, Recober, A (2009) A Potential Preclinical Migraine Model: CGRP-Sensitized Mice. Mol Cell Pharmacol 1: 264-270 (review).

Recober A, Kaiser EA, Kuburas A, **Russo AF** (2010) Induction of multiple photophobic behaviors in a transgenic mouse sensitized to CGRP. Neuropharmacology 58: 156-165. PMID: 19607849

Sabharwal R, Zhang Z, Lu Y, Abboud FM, **Russo AF**, Chapleau MW (2010) Receptor activity-modifying protein-1 increases baroreflex sensitivity and attenuates angiotensin-induced hypertension. Hypertension (Epub) PMID: 20100989

D. Research Support

Ongoing

R01 DE016511-17 Russo (PI) 7/1/05-4/30/10
NIH, NIDCR
"Neuronal Control of CGRP Gene Expression"
The major goal of this project is to understand the cell-specific mechanisms and signal transduction paths that control transcription of the calcitonin gene-related peptide (CGRP) gene. A combination of primary trigeminal neurons and in vivo studies will be used to study CGRP gene regulation.
Role: PI

GIA 0855944G Russo (PI) 7/1/08- 6/30/10
American Heart Association
"Genetic enhancement of CGRP receptor signaling increases baroreceptor sensitivity and attenuates hypertension"
The major goal of this project is to test the hypothesis that the RAMP1 subunit of the CGRP receptor increases the protective activity of CGRP in angiotensin II-induced hypertension. The study will explore the mechanisms underlying this protection. The approach will involve expression of human RAMP1 in transgenic mice.
Role: PI

No number Russo (PI) 7/1/09- 6/30/11
National Headache Foundation
"Does pregnancy reduce light aversion in a mouse model of migraine?"
The major goal of this project is to test the hypothesis that the nestin/hRAMP1 transgenic mice will display less light aversion or photophobia when pregnant, as commonly reported by women during pregnancy.
Role: PI

Completed (in past 3 years)

R21 DE018149 Russo (PI) 2/1/07-1/31/09
NIH, NIDCR
"Development of a Mouse Trigeminal Pain Model"
The goal of this project was to develop a mouse model for migraine and other trigeminal pathologies. A preliminary series of nociceptive behavioral assays was used to establish the feasibility of this mouse model. This is in a no-cost extension until 6/31/10.
Role: PI

NF073016 Hammond (PI) 2/1/08 - 01/31/09
DoD
"Receptor Activity Modifying Protein and Functional Increases in the Activity of Calcitonin Gene-Related Peptide Receptor in Pain of Neurofibromatosis"
The goal of this Concept Award was to test the hypothesis that the efficacy of CGRP at CGRP receptors is increased in a mouse model of NF, possibly due to increased levels of RAMP1. A multidisciplinary approach that utilizes molecular, neuroanatomical and behavioral approaches in concert was proposed.
Role: Co-investigator